

Traditional Process Representations are Ill-Suited for Knowledge-Intensive Processes

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Introduction

A business process is “a set of one or more linked procedures or activities which collectively realize a business objective or policy goal, normally within the context of an organisational structure defining functional roles and relationships.” (Lawrence 1997)

It is the aim of this position paper to analyze the adequacy of existing business process representations in the context of comprehensive knowledge management. For the purpose of this paper, comprehensive knowledge management consists not only of the management of documents (*product-oriented* knowledge), but also experience and knowledge on how to create and adapt these documents (*process-oriented* knowledge). In this context, process-oriented knowledge can be further decomposed into the process description itself and experience on performing the process (e.g., in the form of a process trace, decisions taken while performing the process, or a set of lessons learned).

Processes are modeled for various purposes. Among the possible objectives are the support of human communication, easy analysis and reasoning of/about existing processes, guidance and control support, and enabling automated support (e.g., in the form of workflow systems). Often several of these objectives shall be achieved at the same time.

Another dimension of process classification is the amount of knowledge available about a process and, thus, the stability of its description. Debenham distinguishes three types of processes (Debenham 2000):

- **Activity-centered process.** This type of process has two properties. First, it has a unique, valid decomposition. Second, the sub processes in its decomposition terminate when a specific goal is attained.
- **Goal-centered process.** This type of process has also two properties. First, it does *not* have a unique, valid decomposition. Second, the sub processes in each

decomposition terminate when a specific goal is attained. Therefore, there is a choice of decomposition when performing the overall process. If the decomposition is chosen incorrectly, the goal of a sub process may not be attained.

- **Knowledge-centered process.** For this type of process, the termination of at least one of its sub processes is not determined by the attainment of a goal. Thus, this type includes all processes whose goals are vague or may mutate.

In this paper, I will refer to the latter two types of processes as *knowledge-intensive processes*. Knowledge-intensive processes have (among others) the following characteristics:

- They contain a creative element, that is, their (sequence of) actions cannot be completely predefined.
- Their overall process description can be given only on an abstract level and is often coarse-grained or incomplete.
- For some (isolated) aspects, more detailed information exists, for example, in the form of experience telling what actions were taken in which situation and the result of these actions.

An adequate business process representation must be able to deal not only with activity-centered processes, but also with knowledge-intensive processes. Moreover, the adequacy of process representations depends on:

- The **purpose** of the process description (see above).
- The **environment**. For example, the decision to become an ISO 9000 certified company may impose constraints on the process representation.
- The **experience of the process performer**. Clearly, experts need less guidance than novices (e.g., people that joined an organization only recently). Furthermore, novices should adhere more closely to process descriptions than experts because experts know under which circumstances they should deviate from a recorded process description (based on their intuition). Novices typically do not have the necessary experience to make a decision on when to deviate. Although an

optimal process performance will not necessarily be achieved, it will be better than if they would re-invent how to attain the goal of the process. Consequently, process control should be more strict for less experienced people.

Position Statement

To enable experts to worry about the “real hard problems”, it must be the objective of an organization to transform knowledge-intensive processes to activity-centered processes over time. This will change knowledge-intensive processes to routine processes which can be performed by less experienced people.

To support this continuous process improvement, it is necessary for an adequate business process representation to provide constructs for:

- The static, stable parts of a process description (also known as process model).
- The dynamic parts of a process description (process traces, lessons learned, collected data, etc.). These may be very fine-grained. For example, the output of an acquisition process is a contract. To support the knowledge-intensive acquisition process, text blocks should be available. These text blocks should be offered under certain conditions (e.g., if a customer is known to be “lazy”, the required input for a cooperation project with its due date should be included in the contract).
- Knowledge related to processes which may be of help while performing the process (e.g., templates and documents for deliverables to be produced as output of a process). This related knowledge is context-sensitive. For example, to support the acquisition process, it is not enough to provide all available contracts. Instead, a process guidance system should ask for criteria which will enable the selection of the best fitting contract for the current acquisition process.

Systems that are available on the market today tend to support either the management of documents or the management of processes. Systems that support business processes (e.g., workflow systems), assume an activity-oriented process. Thus, their process representation does not support knowledge-intensive processes well.

Recent research approaches address knowledge-intensive processes. For example, in the MILOS project an initial project plan is defined (activity-centered description). However, as the project progresses, the description is decomposed on the fly (Maurer et al. 2000). If – for some reason – the performance of a sub process fails, the project status is restored as it was at the beginning of the failed sub process. Then a new sub goal is defined and a new decomposition is tried. Other approaches capture the dynamic knowledge (Tautz, Althoff, and Nick 2000; paper by Andreas Jedlitschka et al. in these workshop proceedings).

However, a successful comprehensive knowledge management requires a seamless integration of all kinds of knowledge listed above. As of today, there exists no system (and no process knowledge representation) that integrates all these aspects into a single, coherent knowledge representation. Such a knowledge representation must not only support the various purposes listed in the introduction, it must also offer predefined operations for the automatic generation/configuration of process descriptions from the available process knowledge based on a context description.¹ Furthermore it must support the refinement of process descriptions based on the available knowledge, and thus, the continuous improvement of process descriptions and transformation of knowledge-intensive processes towards activity-centered processes.

In conclusion, adequate process representations are available for activity-centered processes. However, for knowledge-intensive processes, traditional process representations are inadequate. New approaches from research address parts of the representation problem. These approaches need to be integrated and complemented.

References

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¹ This does not only include the composition of a process description from activity descriptions, but also the selection of relevant process-oriented knowledge (such as applicable lessons learned, typical effort figures and other data as well as help for making decision) and process-related knowledge (e.g., relevant templates and documents).